

3. NEPA REVIEW PROCESS

3.1 SUMMARY OF 1987 AND 1997 EA

As mentioned in Section 1.1 of this document, DOE prepared an EA (DOE 1987) prior to the construction and operation of CEBAF. The EA evaluated and compared the impacts of the construction and operation of a facility to utilize CEBAF technology as opposed to an alternative technology (i.e., pulsed LINAC with pulse stretcher ring), and considered alternatives to the proposed site at Newport News, Virginia (i.e., Charlottesville or Blacksburg, Virginia). In the 1997 EA, a proposed change in operating parameters of CEBAF and the operation of the FEL were reviewed.

CEBAF produces an electron beam for experiments in nuclear physics, particularly for the study of quark structures and behaviors and the forces that govern the clustering of nucleons in the atomic nucleus. In the 1987 EA, impacts were evaluated for the proposed operation of an electron beam in the range of 0.5 to 4.0 GeV beam energy with a maximum beam power of 1000 kW. In the 1997 EA, impacts were evaluated for operation up to 8.0 GeV while maintaining the 1000 kW beam power limit. The EA also evaluated the operation of the FEL for producing a laser beam up to 20 kW IR and 10 kW UV (DOE 1997).

DOE issued a FONSI on January 12, 1987 for the 1987 EA and November 5, 1997 for the 1997 EA. The 1987 EA identified short-term impacts to air quality, groundwater, soils, and ambient noise anticipated from construction activities. No major environmental impacts, or adverse effects on worker and public health, were predicted for either CEBAF construction or operation. Construction of CEBAF was completed in early 1995, and regular operations commenced shortly thereafter. In the 1997 EA, releases of radionuclides to the environment that could have adverse effects on worker and public health and/or any ecosystem were analyzed and it was determined that no substantial impacts would be expected from the operation of CEBAF or the FEL at the operating parameters noted above, and as construction would be minimal, there were no anticipated short-term impacts to air quality, groundwater, soils, and ambient noise.

3.2 OTHER ENVIRONMENTAL REVIEWS

Since the 1987 EA and FONSI were issued, some modifications and alterations have been made to facilities and land areas at the Jefferson Lab site. These changes have included the construction of support buildings and other improvements to maintain CEBAF and FEL operations. Before these changes were implemented, they were examined relative to activities covered in the 1987 EA to determine whether further environmental reviews were necessary. All actions were either categorically excluded using criteria in Subpart D of 10 CFR 1021, DOE NEPA Implementing Procedures, or determined to be part of the original scope of actions covered in the 1987 EA (SURA 1990; 1993; 1996). A new EA was prepared in 1997, as further discussed below, for the proposed increase in the maximum CEBAF beam energy up to 8.0 GeV and the operation of the FEL as described in Section 3.1.

The 1997 EA reported the results of an assessment of the potential for increased radiological releases due to increasing the CEBAF beam energy for the purposes of accelerator testing and operation, from energies up to 4.0 GeV with a maximum beam power of 1,000 kW, to energies of 4.0 to 8.0 GeV with a beam power not to exceed 1,000 kW as averaged over a one-week time period. This small variation in operating power level enables CEBAF operations staff to perform occasional small adjustments in beam current levels without exceeding established administrative and operational limits.

The three primary sources of potential impact identified and examined in the 1997 EA were: radiological impacts on occupational health, radiological impacts on public health, and induced radioactivity in groundwater. On examination, as the beam power would not increase beyond the present level set for

4.0 GeV operations, no increase in radiological doses to workers was expected. In evaluating offsite radiological exposure, it was determined that skyshine radiation exposure, the chief source to members of the public, would not increase, but would likely decrease with the rise in beam energy to 8.0 GeV. Therefore, no increase in exposure to the public, even taking into account the small amount of additional airborne radiation that would be generated, would be expected. For the same reason, that is, no effective increase in beam power, the activation of groundwater near the accelerator was expected to remain minimal but constant (Stapleton, G. et al. 1997). Therefore, the groundwater activity levels should remain well below the 5 pCi/ml (picocuries/milliliter) limit of the Commonwealth of Virginia Pollutant Discharge Elimination System (VPDES) Permit that primarily addresses CEBAF operation (VPDES 2001). Thus, it was determined that the action described in the 1997 EA and FONSI did not have the potential for causing impacts beyond those documented in the 1987 EA and FONSI.

In addition, the commitments reported in both EAs and FONSI were reviewed in the course of writing this EA to determine whether they had been addressed appropriately. All of the commitments identified in the two EAs were either performed in the course of ongoing activities, such as installing temporary shielding to limit radiation dose to the general public or, as needed, as when the requirement for a new permit was identified. In line with the commitments in both EAs, current procedures are updated and new procedures are instituted as identified by Jefferson Lab staff and by the DOE. With commitments and best management practices in mind, the DOE has frequently interacted with federal, state, and local agencies and authorities to stay informed of regulatory and policy changes that could affect the operation of CEBAF and the FEL.

3.3 SCOPE OF THIS EA

The DOE prepared this EA with the assistance of SURA and Oak Ridge Operations Office staff, pursuant to Sect. 102 of NEPA of 1969 (Public Law 91-190), as implemented by regulations promulgated by the President's CEQ (40 CFR, Parts 1500–1508, November 1978 and changes) and DOE NEPA Implementing Procedures (10 CFR Part 1021, April 1992 and changes). It is intended to:

- provide sufficient evidence and analysis for DOE to determine whether to prepare an Environmental Impact Statement (EIS) or a FONSI;
- assure that DOE complies with NEPA when an EIS is not necessary; and/or
- facilitate preparation of an EIS, should one be determined to be necessary.

Pursuant to Sect. 1508.9 of the CEQ regulations, this EA presents information and analyses of the proposed action and all reasonable alternatives. Section 2 describes the proposed construction actions and alternatives for each activity and notes some of the potential environmental impacts of each. Regarding Helios, the proposed Helios operating parameters are presented in Section 2.2.5.1. The discussion on Helios includes the 'no action' alternative in Section 2.3.6 and the lack of other alternatives in Section 2.4.6. Section 4 describes the existing environment and reports the environmental, safety and health impacts of the proposed action. The discussion of impacts includes a description of any adverse effects that cannot be avoided should the proposal be implemented, irreversible impacts, if any, and any mitigation measures needed to minimize adverse impacts.

The proposed action involves construction of up to four major additions to the CEBAF Center, the main facility administration building, and construction of four important structures on the accelerator site (a new storage building, a new technical support building, a new refrigeration service building, and an addition to the FEL Facility). See Figure 2 for a site map showing their locations. The FEL Addition will be the location for the installation and operation of the new high-energy lithography source called Helios. The improvements addressed in this EA will assist the Laboratory in making full use of this national

physics resource by better accommodating existing staff and additional research personnel and by extending research capabilities with the addition of a new synchrotron light source.

The proposed action primarily involves new construction activities and does not involve operational changes or equipment modifications to CEBAF or the FEL. Thus, the impact analysis in this EA focuses on (1) the temporary impacts due to some fairly large-scale construction actions on surface water, air quality, and noise concerns; (2) the ultimate changes in site land use due to these actions including effects on terrestrial resources and stormwater control and effects from building operations; and (3) the installation and operation of Helios and the assessment of the potential for radiological impacts to the public and workers and the potential for activation in the surrounding environment. There is little potential for adverse impacts from any of the following focus areas: long-term non-radiological air quality; groundwater activation; geology and soils; floodplains; wetlands; or community resources including cultural and socioeconomic effects.

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